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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/542,780	09/27/2005	Tetsuya Taki	PTGF-04041US	9224
21254	7590	02/14/2007	EXAMINER	
MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817			GOODWIN, DAVID J	
			ART UNIT	PAPER NUMBER
			2818	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/14/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/542,780	TAKI, TETSUYA	
	<b>Examiner</b>	<b>Art Unit</b>	
	David Goodwin	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 05 December 2006.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-14 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-14 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) <input type="checkbox"/> Other: _____ .

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim states that the donor impurity is substantially distributed uniformly.

3. The specification does not teach, enable or suggest this limitation. The specification repeatedly states that the concentration corresponds to the activation rate and shows a graph wherein the concentration rises between the first and second layers. However the specification does not suggest a uniform concentration

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 3, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto (US 6,064,079).

3. Regarding claim 1.

4. Yamamoto teaches a group III nitride based semiconductor device (column 1 lines 45-60). Said device comprises a first p-layer (15) and a second p-layer (18) to each of which an acceptor impurity is added (column 5 lines 15-25). An intermediate layer (17, 34) is provided between the first p layer and the second p layer (column 5 lines 25-40). The intermediate layer (17, 34) is doped with a donor impurity concentration (column 5 lines 25-55).

5. A concentration distribution is fixed in the finished device. The means and method by which the concentration distribution is determined will not materially distinguish the device from another device wherein the concentration distribution is determined by a substantially different means. As the applicant has claimed the device and not the means and method by which the device is made the claims are evaluated as device claims.

1. Initially, and with respect to claim 35, note that a "product by process" claim is directed to the product per se, no matter how actually made. See *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) and related case law cited therein which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in *Thorpe*,

- a. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*. 411 F2d 1345, 1348, 162 USPQ 145, 147, (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir 1935).
2. Note that Applicant bears the burden of proof in such cases as the above case law makes clear.
6. Regarding claim 2.
7. Yamamoto teaches the donor impurity doped into the intermediate layer is doped with a concentration distribution corresponding to a concentration distribution of the acceptor impurity in the intermediate layer (fig 2B) (column 5 lines 35-60).
8. Regarding claim 3.
9. Yamamoto teaches the acceptor impurity is magnesium and the donor impurity is silicon (column 5 lines 10-45).
10. Regarding claim 6.
11. Yamamoto teaches the first p layer (15) includes a p cladding layer (15) made of p type AlGaN doped with Mg (column 5 lines 10-25). The second p-layer (18) includes a p contact layer (18) made of p type GaN doped with Mg (column 5 lines 10-30).
- 12.

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto (US 6,064,079) as applied to claim 1 above and further in view of Fukuda (JP2003-115610).

15. Regarding claim 4.

16. Yamamoto teaches elements of the claimed invention above in the rejection of claim 1.

17. Yamamoto does not teach the relative concentrations of the dopants.

18. Fukuda teaches a group III nitride semiconductor device. Said device comprises intermediate layers having concentration of Mg dopant of  $1E18/cm^3$  and intermediate layers having silicon dopant concentration of  $1E17/cm^3$  (translation paragraphs 0010-0015). The ration of which is 10 to 1.

19. It would have been obvious to one of ordinary skill in the art to dope the intermediate layer with these concentrations in order to reduce current leakage without affecting the crystal structure.

20. Regarding claim 5.

21. The above concentrations of dopants will result in a hole density of less than  $10^{17}/\text{cm}^3$ .

22.

23. Claims 7 through 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto (US 6,064,079) in view of Kaneyama (US 2002/0014632).

24.

25. Regarding claim 7.

26. Yamamoto teaches that a group III nitride semiconductor device is formed on a sapphire substrate (10) (column 5 lines 15-25). An n contact layer (12) formed on the sapphire substrate (10) (column 4 lines 30-40). An n cladding layer (13) formed on the n contact layer (12) (column 4 lines 30-45). A light emitting layer (14) formed on the n cladding layer (13) (column 4 lines 30-50). A p cladding layer (15) and a p type contact layer (18) to each of which an acceptor impurity is added (column 5 lines 15-45). An intermediate layer (17, 34) provided between the p cladding layer (15) and the p contact layer (18). A p electrode (22) is disposed on the p contact layer (18). An n electrode (21) disposed on the n contact layer (12). The intermediate layer (17, 34) is doped with a donor impurity concentration (column 5 lines 25-55).

27. A concentration distribution is fixed in the finished device. The means and method by which the concentration distribution is determined will not materially distinguish the device from another device wherein the concentration distribution is determined by a substantially different means. As the applicant has claimed the device

and not the means and method by which the device is made the claims are evaluated as device claims.

3. Initially, and with respect to claim 35, note that a “product by process” claim is directed to the product per se, no matter how actually made. See *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) and related case law cited therein which make it clear that it is the final product per se which must be determined in a “product by process” claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. As stated in *Thorpe*,

b. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*. 411 F2d 1345, 1348, 162 USPQ 145, 147, (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir 1935).

28. Note that Applicant bears the burden of proof in such cases as the above case law makes clear.

29. Yamamoto does not teach that the p electrode comprises a thin film electrode and a thick film electrode.

30. Kaneyama teaches group III nitride semiconductor device comprises a contact layer (109). A thin film electrode (110) is disposed on said contact layer (109). A thick film electrode (120) is disposed on the thin film electrode (109) (fig 1) (paragraph 0036-0039).

31. It would have been obvious to one of ordinary skill in the art to form an electrode of a thin film and a thick film in order to form a good electrical connection without blocking the emitted light.

32. Regarding claim 8.

33. Yamamoto teaches that the light emitting includes a multiquantum well structure (14) formed on the n cladding layer (13) by laminating multiple pairs of well layers of undoped InGaN and barrier layer of undoped GaN (column 4 lines 25-45).

34. Regarding claim 9.

35. Kaneyama teaches group III nitride semiconductor device comprises a contact layer (109). A thin film electrode (110) is disposed on said contact layer (109). Said thin film electrode (110) is formed of a layer of cobalt (111) and a second layer of gold (112) (paragraph 0038). A thick film p electrode (120) is disposed on the thin film electrode (109) (fig 1) (paragraph 0036-0039). Said thick film p electrode is formed by laminating a first layer of vanadium (121), a second layer of gold (122), and a third layer aluminum (123) sequence on the thin film p electrode (110) (paragraph 0039).

36. It would have been obvious to one of ordinary skill in the art to form an electrode of a thin film and a thick film in order to form a good electrical connection without blocking the emitted light.

37. Regarding claim 10.

38. Kaneyama teaches a reflective metal layer (150) of aluminum formed on the sapphire substrate (101) (paragraph 0040).

39. It would have been obvious to one of ordinary skill in the art to form a reflective metal layer in order to direct all emitted light in one direction thereby increasing the efficiency of the device.

40. Claims 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto (US 6,064,079) as applied to claim 1 above and further in view of Fukuda (JP2003-115610).

41. Regarding claim 11.

42. Yamamoto teaches elements of the claimed invention above in the rejection of claim 1.

43. Yamamoto further teaches that the intermediate layer has a high resistivity.

44. Yamamoto does not teach the relative concentrations of the dopants.

45. Fukuda teaches a group III nitride semiconductor device. Said device comprises intermediate layers having concentration of Mg dopant of  $1E18/cm^3$  and intermediate layers having silicon dopant concentration of  $1E17/cm^3$  (translation paragraphs 0010-0015). The ration of which is 10 to 1.

46. Further, an amount of donor impurity will inherently offset an amount of acceptor impurity.

47. It would have been obvious to one of ordinary skill in the art to dope the intermediate layer with these concentrations in order to reduce current leakage without affecting the crystal structure.

48. Regarding claim 12.

49. Fukuda teaches that the intermediate layer (11) is about 100 nm (table 1).

50. It would have been obvious to one of ordinary skill in the art to form an intermediate layer of about 100 nm in order to

51. Regarding claim 13.

52. Fukuda teaches that a uniformly n type layer is formed between the first and second p type layers (paragraphs 0010-0015).

53. It would have been obvious to make the layer substantially uniform so as to avoid unwanted weak spots.

54. Regarding claim 14.

55. Fukuda teaches a group III nitride semiconductor device. Said device comprises intermediate layers having concentration of Mg dopant of  $1E18/cm^3$  and intermediate layers having silicon dopant concentration of  $1E17/cm^3$  (translation paragraphs 0010-0015). This results in the donor and acceptor activation rates being substantially equal.

56. It would have been obvious to one of ordinary skill in the art to dope the intermediate layer with these concentrations in order to reduce current leakage without affecting the crystal structure.

#### ***Response to Arguments***

57. Applicant's arguments filed 12/05/06 have been fully considered but they are not persuasive.

58. The applicant argues that Yamamoto does not teach an intermediate layer.

59. However, Yamaoto does teach a layer between/intermediate first and second p type layers.

60. The applicant argues that the means by which the concentration profile is determined is different than the prior art.
61. The applicant is reminded that the claims are directed towards the structure of the device and not the means and method by which it is made.
62. Applicant's arguments with respect to claims 1 through 10 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

63. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Goodwin whose telephone number is (571)272-

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8451. The examiner can normally be reached on Monday through Friday, 9:00am through 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571)272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DJG

*Andy Maynard  
Andy Maynard  
Primary Examiner*